

CLAIMS

What is claimed is:

1. An air purification system comprising:
a substrate; and
a photocatalytic coating applied on said substrate;
a control including memory that stores information correlating one of a level of humidity and a level of temperature to one of a wavelength of energy and an intensity of energy;
one of a humidity sensor to detect a current level of humidity and a temperature sensor to detect a current temperature; and
an energy source to generate one of a desired wavelength of said energy and a desired intensity of energy based on one of said current level of humidity and said current level of temperature and said information stored in said control to desorb water that adsorbs on said photocatalytic coating.
2. The air purification system as recited in claim 1 wherein said energy is microwaves.
3. The air purification system as recited in claim 1 wherein said energy is radiowaves.
4. The air purification system as recited in claim 1 wherein said photocatalytic coating is titanium dioxide.
5. The air purification system as recited in claim 1 further including further including a surrounding enclosure defined by porous screens defining an energy cavity, and said substrate, said photocatalytic coating, and said light source are located in said energy cavity.

6. The air purification system as recited in claim 5 wherein said one of said humidity sensor and said temperature sensor is located outside of said energy cavity.
7. The air purification system as recited in claim 1 wherein said one of said humidity sensor and said temperature sensor detects one of said current level of humidity and said current level of temperature of air entering said air purification system.
8. The air purification system as recited in claim 1 wherein said one of said desired wavelength and said desired intensity of energy changes as said one of said current level of humidity changes and said current level of temperature changes.
9. The air purification system as recited in claim 1 wherein said desired wavelength of energy is absorbed by said adsorbed water and not absorbed by said photocatalytic coating and said substrate.
10. The air purification system as recited in claim 1 further including a contaminant sensor that senses a level of contaminants.
11. The air purification system as recited in claim 10 wherein said contaminant sensor sends said level of contaminants to said control to adjust said one of said desired wavelength of energy and said intensity of energy.
12. The air purification system as recited in claim 1 further including a light source to activate said photocatalytic coating, and said photocatalytic coating oxidizes contaminants that are adsorbed onto said photocatalytic coating when activated by said light source.
13. The air purification system as recited in claim 12 wherein said light source is an ultraviolet light source.

14. The air purification system as recited in claim 12 wherein photons from said light source are absorbed by said photocatalytic coating to form a reactive hydroxyl radical that oxidizes contaminants in the presence of oxygen and water to water and carbon dioxide.

15. The air purification system as recited in claim 12 wherein said contaminants are one of a volatile organic compound and a semi-volatile organic compound including at least one of formaldehyde, toluene, propanal, butene, acetaldehyde, aldehyde, ketone, alcohol, aromatic, alkene, and alkane.

16. The air purification system as recited in claim 1 further including a metal oxide on said photocatalytic coating, and said metal oxide is at least one of WO_3 , ZnO , CdS , SrTiO_3 , Fe_2O_3 , V_2O_5 , SnO_2 , FeTiO_3 , PbO , Co_3O_4 , NiO , CeO_2 , CuO , SiO_2 , Al_2O_3 , Mn_xO_2 , Cr_2O_3 , and ZrO_2 .

17. The air purification system as recited in claim 1 wherein said substrate is an array of voids separated by a solid.

18. A method of desorbing water comprising the steps of:
 - sensing one of a current level of humidity and a current level of temperature;
 - determining one of a desired wavelength of energy and a desired intensity of energy based on said one of said level of humidity and said level of temperature;
 - emitting said one of said desired wavelength of energy and said desired intensity of energy desired wavelength of energy;
 - absorbing said desired wavelength of energy by said water; and
 - desorbing said water from a photocatalytic coating.

19. The method as recited in claim 18 further including the steps of sensing a contaminant level of contaminants and adjusting one of said desired wavelength of energy and said desired intensity of energy in response to the step of sensing said contaminant level.